REMARKS

This amendment is responsive to the Office Action mailed June 7, 2005 in connection with the above-identified patent application. That Action was made final. However, claims 12-18, 21-31, and 37-40 were allowed. Claims 1, 11, 32, 35, and 36 have been rejected. Lastly in the Action, claims 33 and 34 were objected to.

With regard to the claim rejections, independent claims 1, 11, and 32 together with dependent claims 35 and 36 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Japanese Patent JP 05-199721 to Takahashi and U.S. Patent No. 5,006,765 to Schmider.

Dependent claim 35 was objected to because, according to the Examiner, there is no antecedent basis for "the resilient member" language in that claim.

Claim 33 is dependent on independent claim 32 but was indicated as containing allowable subject matter. To that end, claims 33 and 34 were merely objected to as being dependent upon a rejected base claim (claim 32) but were indicated as being allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claims.

The Present Application:

For purposes of review, the present application is directed to an electromotive motor for possible use with a pump of a power-assisted steering system in a motor vehicle. One advantage offered by the electromotive drive is that disturbing noises caused by vibrations are reduced and/or prevented. Prior art electromotive systems included a rigid coupling between a stator and a shaft support system. This generated a "tuning fork" effect when the resonant frequency of the system falls in the range of the unavoidable high frequency torque vibrations. Such torque variations or vibrations are particularly unavoidable with electric motors and which have sufficient amplitude to lead to the disturbing noises, especially when the pump is operated with a full load.

In accordance with one aspect of the present invention, the transmission of the torque moment occurs essentially via the coupling of the stator with the remaining housing through an intermediary base plate and not through the shaft support. The shaft support serves for positioning the stator in the plane which extends transversely in relation to the shaft support.

An improved suppression of the disturbing noises is obtained by providing a gap between the interior wall of the stator and the outer wall of the shaft support. Vibration-absorbing elements are preferably included in the system to maintain the gap and include, for example, O-rings. Also, the gap can be filled at least partially with a viscous medium. The O-rings, however, do not transmit torque between the stator and the shaft support.

In the preferred embodiment of the invention as described in the specification, the torque transmission from the stator to the remaining housing takes place via a supporting base plate. The base plate preferably includes a punched-out grid. The stator is mounted directly onto the supporting base plate. The base plate is in turn mounted to the motor housing. The support shaft extends from the motor housing and rotatably supports the motor output shaft therein.

More specifically and with reference to the drawing figures of the application, in order to avoid noises which develop with prior art drives in use heretofore, the stator 7 is not joined directly to the shaft support 15. Rather, the shaft support 15 and the stator 7 are arranged such that a gap exists between an inner wall of the stator 7 and an outer wall of the shaft support 15. Preferably, one or more O-rings 12 are disposed in grooves 12a on the outer wall of the shaft support 15. The O-rings 12 preferably have flexibility and produce a dampening effect, thus acting as vibration-dampening elements between the stator and the shaft support 15. A viscous medium such as a grease or the like can be disposed in the gap between the stator and the shaft. It is to be appreciated that a substantially rigid coupling between the stator 7 and the shaft support 15 is avoided. Such a rigid coupling would support tangential power transmission or the transmission of torque from the stator 7 to the shaft support 15. This is undesirable and avoided in the present application.

Japanese Patent JP 5-199,721 – (axial vibration suppression only):

Japanese Patent JP 5-199,721 to Takahashi teaches a motor adapted to suppress an phenomena of a vibrating printed circuit board fixed with a stator of a brushless DC motor in an axial direction caused by mutual operation by magnetic attraction and repulsion between a stator core and a rotor magnet. As shown in the drawing figure of the Takahashi '721 patent, a stator core 10 of a brushless DC motor is fixed to a printed circuit board 13. An outer periphery of the board 13 is clamped with

an upper surface 6a of a housing using screws. The surface 6a of the housing is formed at its inner periphery higher than its outer periphery. Thus, mounting rigidity of the board 13 is enhanced and an axial vibration is suppressed to reduce noise. Thus, the deterioration of rotating performance of the motor can be prevented by contact of the rotor surface of the printed circuit board 13 with the upper surface 6a of the housing.

It is to be appreciated that in Takahashi '721, the entire bottom surface of the printed circuit board 13 is in contact with the upper surface 6a of the housing to suppress axial vibration of the housing. Also, the board is rigidly held against the housing. The stator is carried on the board and, therefore, is effectively rigidly coupled to the housing through the rigid board connection.

U.S. Patent No. 5,006,765 to Schmider:

U.S. Patent No. 5,006,765 to Schmider describes a DC motor with a coreless coil installation. More particularly, a stator coil 8 is provided in the motor. However, the stator coil 8 is not mounted to the housing by means of a shaft support which transverses the stator.

In the Action, the Examiner took the position that Schmider teaches an extrusion-coated punched-out grid to support a stator inside a motor to provide a cost effective and reliable electrical connection to the motor. However, because of the physical construction to the motor taught in the Schmider '765 patent, the stator coil 8 is separated from the shaft support 11 by a fairly large distance and, accordingly, vibration in the stator and shaft support components are not of particular concern. Essentially, vibrations in the shaft support and stator are not even mentioned in the Schmider '765 patent.

In addition to the above, it is respectfully submitted that the shaft support 11 taught in the Schmider '765 patent does not truly traverse the stator coil 8.

Independent Claim 1 is in Condition for Allowance:

It is respectfully submitted that independent claim 1 is patentably distinct and unobvious over the references of record. More particularly, as noted by the Examiner, the Takahashi '721 teaching does not include a showing of an extrusion-coated punched-out grid to dampen torque vibrations. Independent claim 1 includes the limitation of the base plate including an extrusion-coated punched-out grid. In

addition, the Examiner has noted that the Schmider '765 patent shows an extrusion-coated punched-out grid that would reduce high frequency torque vibrations if substituted into the circuit board construction taught in the Takahashi '721 patent. However, applicant respectfully submits that if the punched-out grid taught in the Schmider '765 patent were put into the position and arranged as shown in the Takahashi '721 patent, at best, only axial vibrations would be dampened, but no torque vibrations would be dampened at all. More particularly, as can be seen in Figures 1-3 of the Takahashi '721 patent, the circuit board is held at an angle (Figure 1), on a step (Figure 2), or in a pinned (Figure 3) configuration to "pre-stress" the circuit board so that it is held fixed relative to the housing bottom. It is therefore unclear to applicant how the mere substitution of a punched-out grid of the type alluded to in the Schmider '765 patent could be used in the construction taught in the Takahashi '721 patent to relieve or otherwise eliminate high frequency vibrations. The Takahashi construction does not permit the board to flex.

Applicant respectfully submits that independent claim 1 is directed to a novel electromotive drive including a housing, a stator, and a base plate including an extrusion-coated punched-out grid fastened to the housing whereby transmission of a torque moment from the stator to the housing occurs via the base plate and whereby high frequency vibrations of transmitted torque are dampened by the punched-out grid.

Applicant respectfully submits that the combination suggested by the Examiner is not suggested in the art and, further, is not proper. In addition, even if the combination were made, it would not exhibit the high frequency vibration suppression/dampening as required in independent claim 1. In addition to the above, it is respectfully submitted that the Examiner has combined the Takahashi and Schmider patents in a manner that one of ordinary skill in the art would never consider. To that end, it is respectfully submitted that the combination suggested by the Examiner was done in hindsight in view of the pending claims. More specifically, the skilled artisan would not consider placing or using a punched-out grid as a printed circuit board in the device of Takahashi. The technologies are somewhat incompatible and their combination would serve no useful purpose insofar as suppressing vibrations in a rotational direction or in the plane of the base plate supporting the stator due to torque vibrations which are exerted on the base plate by the stator such as in the present application.

Applicant agrees that the circuit board of Takahashi is fixed so that oscillations are reduced. However, the vibrations reduced are in an axial direction. The technique for reducing axial vibrations in Takahashi is effected in a completely different manner than in the present application. More particularly, in Takahashi, the printed circuit board is banded such that the outer periphery of the board which is shown in the drawings as a ring is bent downwardly as opposed or versus to the inner periphery of the board. This banding of the circuit board leads to an inherent tension in the board which enhances the rigidity of the board in order to suppress axial vibrations of the board and the stator core which is fixed to the printed circuit board.

Once again, applicant respectfully submits that the disclosure in Takahashi is not directed to the suppression or prevention of vibrations within the plane of the base plate supporting the stator due to torque vibrations which are exerted to the base plate by the stator.

Thus, one skilled in the art would not turn to the Takahashi patent in the first place to begin in resolving a solution to vibrations in the plane of the base plate due to torque vibrations. Simply, the Takahashi disclosure would help in reducing axial vibrations but not torque vibrations.

It is not surprising, therefore, that the Takahashi solution, namely bending the outer portion of the board downward to form an inherent tension is a completely different solution because the Takahashi patent is solving a completely different problem, that is, suppressing axial vibrations of a printed circuit board.

Therefore, it is respectfully submitted that one of ordinary skill in the art would not combine the Schmider reference with the solution according to Takahashi. First, as noted above, Takahashi is not directed to suppressing vibrations in the plane of the base plate due to torque vibrations but, rather, is directed to axial vibrations. Furthermore, the use of a punched-out grid as taught in Schmider for the device of Takahashi would suggest that a punched-out grid is being bent downwardly so that the outer periphery of the board versus the inner periphery of the board is oriented in a downward configuration forming an inherent tension which enhances the mounting rigidity of the board to prevent axial vibrations. However, a punched-out grid which is not completely surrounded by plastic molding or the like which would react in a way such that, for example, free contact ends of the grid would not be bent in the desired manner so that the stiffening effect due to Takahashi would not be achieved.

Essentially, applicant respectfully submits that the implementation of the punched-out grid of Schmider in the device taught by Takahashi would simply lessen the effects of the axial vibration suppression taught in Takahashi. It would not result in applicant's invention as recited in the pending claims for suppressing or preventing vibrations within the plane of the base plate due to torque vibrations which are exerted to the base plate by the stator.

Thus, a person skilled in the art would not combine the technical disclosures of Takahashi and the Schmider references.

Still further to the above, the Schmider patent simply does not disclose the use of a punched-out grid in any way to prevent or suppress torque vibrations of a motor. Although the structure of a punched-out grid might be suggested in Schmider, the reasons for using the punched-out grid are in no way related to preventing or suppressing torque vibrations of the motor.

For at least the above reasons, applicant respectfully submits that independent claim 1 is patentably distinct and unobvious over the references of record.

Independent Claim 11 is in Condition for Allowance:

As noted above, it is respectfully submitted that each of the primary art references alone do not teach, suggest, or fairly disclose the subject matter recited in independent claim 11. In addition, it is respectfully submitted that the art is not combinable in a manner suggested by the Examiner. Further, even if the art were combined in the manner suggested by the Examiner, the resultant construction would not result in a dampening of high frequency vibrations of torque transmission through a punched-out grid.

Turning now to independent claim 11, an electromotive drive is recited comprising a housing having a shaft support, a base plate comprising an extrusion-coated punched-out grid, a stator surrounding the shaft support and attached to the base plate whereby high frequency vibrations of the torque transmission are dampened by the punched-out grid, a shaft rotatably arranged within the shaft support, and a rotor attached to the shaft and surrounding the stator.

Independent claim 11 includes the limitation of the stator attached to the base plate comprising an extrusion-coated punched-out grid whereby high frequency vibrations of the torque transmission are dampened by the punched-out grid.

Again, it is respectfully submitted that if a construction were completed in a manner suggested by the Examiner, namely substituting the grid of the Schmider '765 patent into the Takahashi '721 constructions, high frequency vibrations of torque transmission would not be dampened by the punched-out grid. This is a clear limitation contained in independent claim 11. In addition to the above, it is respectfully submitted that the Examiner has combined the Takahashi and Schmider patents in a manner that one of ordinary skill in the art would never consider. To that end, it is respectfully submitted that the combination suggested by the Examiner was done in hindsight in view of the pending claims. More specifically, the skilled artisan would not consider placing or using a punched-out grid as a printed circuit board in the device of Takahashi. The technologies are somewhat incompatible and their combination would serve no useful purpose insofar as suppressing vibrations in a rotational direction or in the plane of the base plate supporting the stator due to torque vibrations which are exerted on the base plate by the stator such as in the present application.

Applicant agrees that the circuit board of Takahashi is fixed so that oscillations are reduced. However, the vibrations reduced are in an axial direction. The technique for reducing axial vibrations in Takahashi is effected in a completely different manner than in the present application. More particularly, in Takahashi, the printed circuit board is banded such that the outer periphery of the board which is shown in the drawings as a ring is bent downwardly as opposed or versus to the inner periphery of the board. This banding of the circuit board leads to an inherent tension in the board which enhances the rigidity of the board in order to suppress axial vibrations of the board and the stator core which is fixed to the printed circuit board.

Once again, applicant respectfully submits that the disclosure in Takahashi is not directed to the suppression or prevention of vibrations within the plane of the base plate supporting the stator due to torque vibrations which are exerted to the base plate by the stator.

Thus, one skilled in the art would not turn to the Takahashi patent in the first place to begin in resolving a solution to vibrations in the plane of the base plate due to torque vibrations. Simply, the Takahashi disclosure would help in reducing axial vibrations but not torque vibrations.

It is not surprising, therefore, that the Takahashi solution, namely bending the outer portion of the board downward to form an inherent tension is a completely

different solution because the Takahashi patent is solving a completely different problem, that is, suppressing axial vibrations of a printed circuit board.

Therefore, it is respectfully submitted that one of ordinary skill in the art would not combine the Schmider reference with the solution according to Takahashi. First, as noted above, Takahashi is not directed to suppressing vibrations in the plane of the base plate due to torque vibrations but, rather, is directed to axial vibrations. Furthermore, the use of a punched-out grid as taught in Schmider for the device of Takahashi would suggest that a punched-out grid is being bent downwardly so that the outer periphery of the board versus the inner periphery of the board is oriented in a downward configuration forming an inherent tension which enhances the mounting rigidity of the board to prevent axial vibrations. However, a punched-out grid which is not completely surrounded by plastic molding or the like which would react in a way such that, for example, free contact ends of the grid would not be bent in the desired manner so that the stiffening effect due to Takahashi would not be achieved.

Essentially, applicant respectfully submits that the implementation of the punched-out grid of Schmider in the device taught by Takahashi would simply lessen the effects of the axial vibration suppression taught in Takahashi. It would not result in applicant's invention as recited in the pending claims for suppressing or preventing vibrations within the plane of the base plate due to torque vibrations which are exerted to the base plate by the stator.

Thus, a person skilled in the art would not combine the technical disclosures of Takahashi and the Schmider references.

Still further to the above, the Schmider patent simply does not disclose the use of a punched-out grid in any way to prevent or suppress torque vibrations of a motor. Although the structure of a punched-out grid might be suggested in Schmider, the reasons for using the punched-out grid are in no way related to preventing or suppressing torque vibrations of the motor.

For at least the above reasons, it is respectfully submitted that independent claim 11 is patentably distinct and unobvious over the reference of record.

In addition to the above, it is respectfully submitted that the Examiner has combined the Takahashi and Schmider patents in a manner that one of ordinary skill in the art would never consider. To that end, it is respectfully submitted that the

combination suggested by the Examiner was done in hindsight in view of the pending claims. More specifically, the skilled artisan would not consider placing or using a punched-out grid as a printed circuit board in the device of Takahashi. The technologies are somewhat incompatible and their combination would serve no useful purpose insofar as suppressing vibrations in a rotational direction or in the plane of the base plate supporting the stator due to torque vibrations which are exerted on the base plate by the stator such as in the present application.

Applicant agrees that the circuit board of Takahashi is fixed so that oscillations are reduced. However, the vibrations reduced are in an axial direction. The technique for reducing axial vibrations in Takahashi is effected in a completely different manner than in the present application. More particularly, in Takahashi, the printed circuit board is banded such that the outer periphery of the board which is shown in the drawings as a ring is bent downwardly as opposed or versus to the inner periphery of the board. This banding of the circuit board leads to an inherent tension in the board which enhances the rigidity of the board in order to suppress axial vibrations of the board and the stator core which is fixed to the printed circuit board.

Once again, applicant respectfully submits that the disclosure in Takahashi is not directed to the suppression or prevention of vibrations within the plane of the base plate supporting the stator due to torque vibrations which are exerted to the base plate by the stator.

Thus, one skilled in the art would not turn to the Takahashi patent in the first place to begin in resolving a solution to vibrations in the plane of the base plate due to torque vibrations. Simply, the Takahashi disclosure would help in reducing axial vibrations but not torque vibrations.

It is not surprising, therefore, that the Takahashi solution, namely bending the outer portion of the board downward to form an inherent tension is a completely different solution because the Takahashi patent is solving a completely different problem, that is, suppressing axial vibrations of a printed circuit board.

Therefore, it is respectfully submitted that one of ordinary skill in the art would not combine the Schmider reference with the solution according to Takahashi. First, as noted above, Takahashi is not directed to suppressing vibrations in the plane of the base plate due to torque vibrations but, rather, is directed to axial vibrations. Furthermore, the use of a punched-out grid as taught in Schmider for the device of

Takahashi would suggest that a punched-out grid is being bent downwardly so that the outer periphery of the board versus the inner periphery of the board is oriented in a downward configuration forming an inherent tension which enhances the mounting rigidity of the board to prevent axial vibrations. However, a punched-out grid which is not completely surrounded by plastic molding or the like which would react in a way such that, for example, free contact ends of the grid would not be bent in the desired manner so that the stiffening effect due to Takahashi would not be achieved.

Essentially, applicant respectfully submits that the implementation of the punched-out grid of Schmider in the device taught by Takahashi would simply lessen the effects of the axial vibration suppression taught in Takahashi. It would not result in applicant's invention as recited in the pending claims for suppressing or preventing vibrations within the plane of the base plate due to torque vibrations which are exerted to the base plate by the stator.

Thus, a person skilled in the art would not combine the technical disclosures of Takahashi and the Schmider references.

Still further to the above, the Schmider patent simply does not disclose the use of a punched-out grid in any way to prevent or suppress torque vibrations of a motor. Although the structure of a punched-out grid might be suggested in Schmider, the reasons for using the punched-out grid are in no way related to preventing or suppressing torque vibrations of the motor.

CONCLUSION

In view of the above amendments, comments, and arguments presented, applicant respectfully submits that all pending claims are patentably distinct and unobvious over the references of record.

Allowance of all claims and early notice to that effect is respectfully requested.

Respectfully submitted,

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